

# Effectively Scaling Project Controls to Address Rapid Project Portfolio Growth

Massachusetts Bay Transportation Authority



# Brendan Paradis, PMP

- Brendan is a project management professional with a proven history of deploying, managing, and improving project controls organizations over more than a decade across a diverse range of industries, organizations, and technical scopes exceeding \$13B individually.
- Project experience includes commercial nuclear facility transactions, facility decommissioning, Department of Defense ACAT 1 atomic weapons program, commercial nuclear operations, EPC construction, and spent nuclear fuel offloads.
- He has served as a subject matter expert for organizations that value his expertise in cost modeling, systems integration and deployment, earned value management, claims, and project turnarounds.



# Marc E. Caruso, PE, PSP, CS

- Marc's experience includes 25 plus years in the Construction Industry.
- 15 years of practical construction experiences supervising, managing, and estimating a variety of large-scale projects for the state, federal and private sectors.
- Primarily, last 10 years of experience have been focused on the Project Controls and continued training and certification in the discipline.
- This blend of construction and Project Controls experience provides for application, leadership, and mentoring, for the advancement of Project Controls.



# The Massachusetts Bay Transportation Authority (MBTA)

## About The T











- One of the oldest public transit systems and the 4<sup>th</sup> largest in the US.
- A division of the Massachusetts Department of Transportation (MassDOT), the MBTA provides subway, bus, Commuter Rail, ferry, and paratransit service to eastern Massachusetts and parts of Rhode Island.
- More commonly known as the T
- Operates the world's oldest continuously operating streetcar system and the
- Investments focused on reliability, resiliency, and the future of the transit system



# The Massachusetts Bay Transportation Authority (MBTA)

## About The T

- >6000 Employees

	Heavy rail			Light rail		Bus service		Commuter Rail <sup>2</sup>	Ferry <sup>3</sup>	
	Red Line	Orange Line	Blue Line	Green Line	Mattapan Line <sup>1</sup>	Bus	Silver Line			
										
Total stations / stops	22	20	12	65	8	7,000+	30	134	7	64 cities
Total vehicles*	222	156	94	227	7	1,026	59	474 <sup>4</sup>	4	386 <sup>5</sup>



## The Challenge:

### Rapid Growth and Right-Sizing the Project Controls Program

The MBTA Capital Investment Plan (CIP) grew by over 400% over five years. In-place processes built for an organization transitioning from executing hundreds of millions of dollars in project work to billions annually

## Solution Areas:

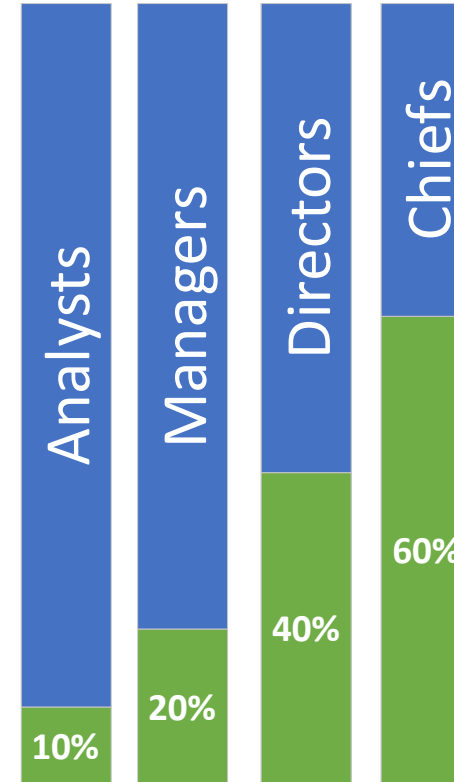
- Implement an Architecture to Support Growth
- Creating Capacity by Increasing Efficiency and Effectiveness
- Forecasting and Reporting to Increase Transparency, Accuracy and Reliability
- Integration of Project Controls Systems and Processes Across the Broader Organization



# Implementing an Architecture to Support Growth

- Developed Standardized “Business Rhythm” for monthly project update forecasting and reporting cycle
- Future initiatives vs current operations % by level
- Integration of project controls personnel into project teams

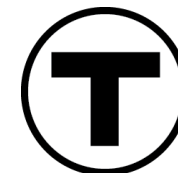
Reservation of Capacity for Future Initiatives



# Implementing an Architecture to Support Growth

Tier 1 & 2 Projects - Construction Cost < \$5M					
Tier 3 Projects - Construction Cost between \$5M and \$15M					
Tier 4, 5 & 6 Projects - Construction Cost >\$15M					
Design duration (cost)	Design duration	Qty	Hours each	Total Hours	
Design (cost)	Master Schedule update (cost and schedule)		24	4	96
Construction	Design schedule review		24	2	48
Estimate	Project Meetings		24	2	48
Budget	CTD Schedule review		3	8	24
Construction	Estimate review		3	4	12
Value	Budget Update Monthly		24	4	96
Risk	Constructability Review		1	12	12
Construction	Value Engineering		1	12	12
Construction	Risk Management		2	12	24
Construction	ICCE		1	8	8
Sub-total design phase				380	
Construction Phase - 3 -year duration					
Budget	Master Schedule update (cost and schedule)		36	4	144
Construction	Construction Schedule review		36	8	288
Budget	Project Meetings		72	2	144
	TIA Review		8	8	64
	Budget Update Monthly		36	4	144
Sub-total Construction phase				784	
<b>Total</b>				<b>1164</b>	

- Standardized project reporting with common standards (project activities, definitions, etc.)
- Defined core responsibilities
- Aligned forecasted support for tasks performed by analysts for each project tier





# Creating Capacity by Increasing Efficiency and Effectiveness

- Mentorship and Career Planning
- Fiscal Year Initiatives
- Training

## Fiscal Year Initiatives

PRIORITY 5

Prepare Templates For Designer Reporting

To improve consistency of reporting from Designers, Project Controls will develop a suite of templates that standardize reporting deliverables. Templates will include Monthly Design Reports, CPS reports that include Baseline Schedule Review, Monthly Schedule Reports, etc.

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PRIORITY 3

Scope Management e-Builder Process

The purpose of developing the project baseline scope is to ensure a project is fully defined at the transition point from the 30% design phase and starts the final design phase. A fully defined and scoped project allows Project Controls to track and monitor the project over its lifecycle.

**Implementation Plan**

Project controls Analysts will review the PM's scope of work statement and provide the Project Manager and Designer with the Project Scope Checklist. Once the baseline scope is established, the Designer will prepare the Scope and Compensation Matrix. Any changes to the baseline scope will be managed through the scope change control e-Builder process that is consistent with Chapter 5 of the Project Controls Manual. The process will require the use of the scope change request process, and all scope changes will be approved at the appropriate delegated authority level.

**Implementation Schedule**

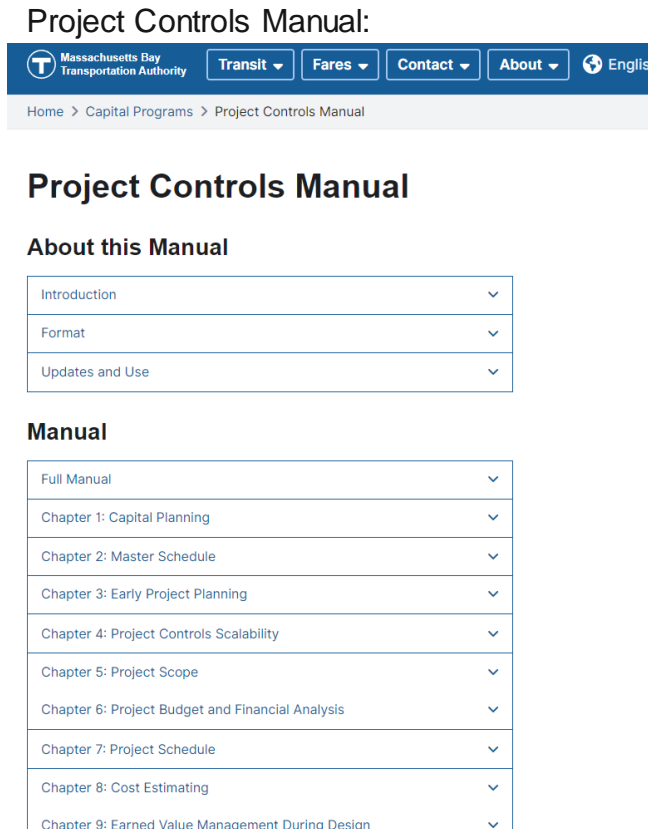
	Complete	FY24												
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Scope Management Definition	✓													
Draft Scope Management SOP														
Develop Scope Management eBuilder process														
Functional testing of process with Pilot Project														
Training of Staff														
Implementation														



# Creating Capacity by Increasing Efficiency and Effectiveness

- Elimination of “precisely inaccurate” from processes
- Clear standards for more consistent work products

Project Controls Manual:



Massachusetts Bay Transportation Authority | Transit | Fares | Contact | About | English

Home > Capital Programs > Project Controls Manual

## Project Controls Manual

### About this Manual

Introduction	▼
Format	▼
Updates and Use	▼

### Manual

Full Manual	▼
Chapter 1: Capital Planning	▼
Chapter 2: Master Schedule	▼
Chapter 3: Early Project Planning	▼
Chapter 4: Project Controls Scalability	▼
Chapter 5: Project Scope	▼
Chapter 6: Project Budget and Financial Analysis	▼
Chapter 7: Project Schedule	▼
Chapter 8: Cost Estimating	▼
Chapter 9: Earned Value Management During Design	▼



# Forecasting and Reporting to Increase Transparency, Accuracy and Reliability

## Consolidated Report Portfolio:

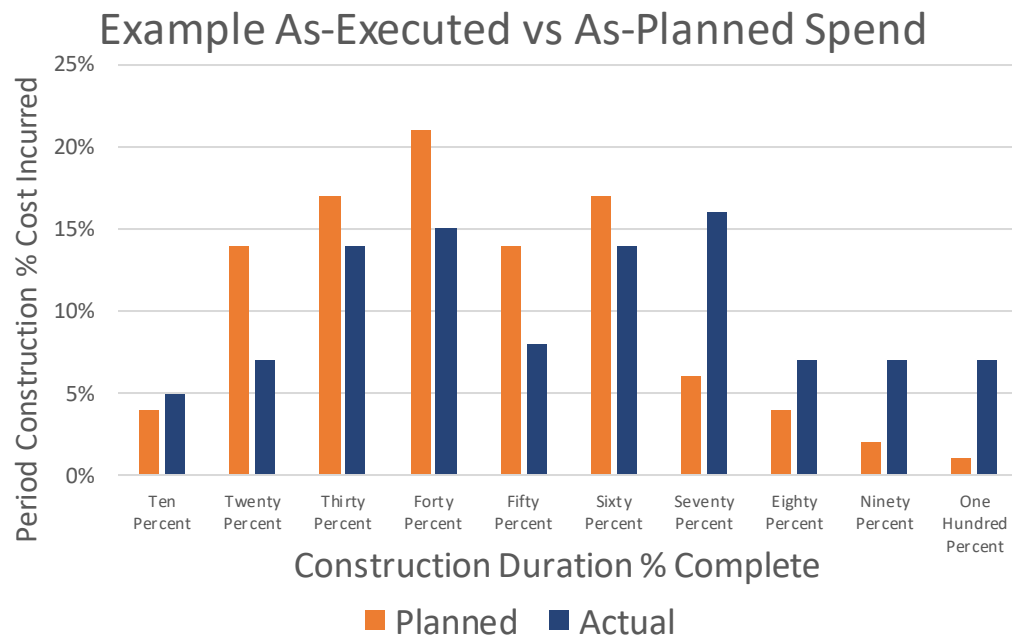
Name	Number	Name
NA	NA	Month End XER
NA	NA	XML Zip file
IMS01	CP.DSGN.ACT	Capital Programs - Design Activities
IMS02	CP.CONST.ACT	Capital Programs - Construction Projects - In Progress
IMS04	CP.PH	Project Handoff to Capital Programs (CD, GLT, OLT, RLT)
IMS05	CP.MS	Milestone Report (Batch Report)
IMS07	CP.DPT.ACT	Capital Programs (CD Trans Projects Only)
IMSDIR	CP.DIR.ACT	By Director
IMS08	CP.CD.CIP.ACT	Capital Delivery - Remaining_Recently Completed Activities
IMS09	CP.CD.CIP.ACT.XLS	Capital Delivery - Remaining_Recently Completed Activities
IMS20	CP.CPS.DPT.TOD	By Dept - TOD
IMS22	CP.CPS.PC-FSR	MBTA Funding Source Report
IMS23	CP.CPS.PC-SCM	Substantial Completion Milestone Report
IMS24	CP.CD.TR-DPU	DPU Transit Projects
IMS25	CP.CPS.CA-CC	Construction Closeout
IMS26	CP.CPS.CA-CP	Construction Procurement
IMS27	CP.CPS.CA-PSP	Professional Services Procurement
IMS28	CP.CPS.CA-PC	Project Closeout
IMS29	CP.CPS.QAQC-PDG	PDG Report
IMS30	CP.TN.DPT.PDF	Transformation Projects Grouped by Project ID
IMS31	CP.TN.DPT.XLS	Transformation Projects by Project ID
IMS36	EM.DPT-ALL	Engineering_Maintenance Projects Grouped by Project ID
IMS41	CIP.ACT.PDF	Capital Investment Plan Grouped by Project ID
IMS44	CIP.ACT.XLS	Capital Investment Plan - Grouped by Project ID
IMS47	OCE.DPT.ACT.PDF	OCE Projects Grouped by Project ID
IMS48	OCE.DPT.ACT.XLS	OCE Projects - Grouped by Project ID
IMS51	RRO.DPT.ACT	RAILROAD OPS Grouped by Project ID
IMS54	SCR.DPT.ACT	SCR Projects Grouped by Project ID
IMS56	VE.DPT.ACT	Veh Engineering Projects Grouped by Project ID
IMS57	VM.DPT.ACT	Veh Maintenance Projects Grouped by Project ID

- Focus on the bigger picture needs of the organization
- Consolidated standard reports (~100 -> 50) Shown Right
- Increasing effectiveness and efficiencies with reporting through increased integration

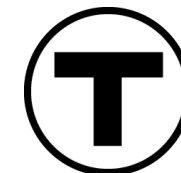
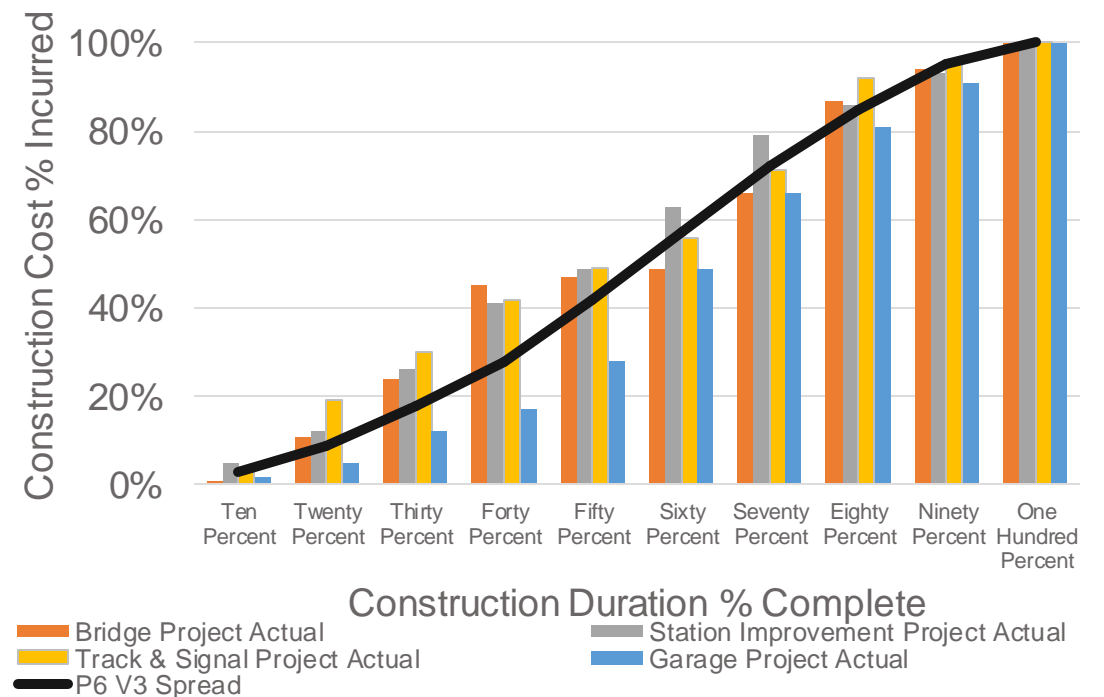


# Forecasting and Reporting to Increase Transparency, Accuracy and Reliability

- Construction Contractor and Project Teams - Optimistic forecasted cashflows— Shown Below
- Developed historical cost curves best-fit to actuals – Shown Right



## Construction Actual Cost Time-Distributions



# Forecasting and Reporting to Increase Transparency, Accuracy and Reliability

- Detailed EACs prepared every month for projects
- Integration of owner-costs in forecasting processes
- Proactive engagement of construction economist

Updated Escalation Table:

	Bridges	Buildings	Parking Garages	Track/Signals/Power
FY2024	5.5%	5.5%	5%	6%
FY2025	4.5%	5%	4%	5%
FY2026	4%	4%	4%	4%
FY2027	4%	4%	3%	4%
FY2028	4%	4%	3%	4%



# Integration of Project Controls Systems and Processes Across the Broader Organization

# Mock Data

- Engaged industry to ensure process changes aligned with external service providers (Construction Industries of Massachusetts (CIM) and the American Council of Engineering Companies (ACEC))
- Developed end-state first roadmap with executive management

Massachusetts Bay Transportation Authority

**Drawbridge Replacement**

**P0014**

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Capital Program Delivered by Capital Delivery: Bridge

2023 Q4

**Project Director:** CONSULT  
**Project Manager:** CONSULT

**Location/Line:** Commuter Rail  
**CIP Priority:** Reliability/Modern

**Project Phase:** Closeout ■

**Project Description**  
Replacement of Drawbridge on the Line. The new bridge will consist of a moveable bascule span with two independent barrels, two spans of precast concrete box beams, a new steel superstructure, and a new micro-pile abutment.

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**Major Activities**

**Last 90 Days**

- ✓ The installation of a sheet pile wall along the northwest causeway has been completed.
- ✓ The wall permanently replaces the temporary emergency shoring that was required due to differing site conditions.
- ✓ Resurfacing, tamping and alignment of the tracks was completed during the May outage.
- Work continues on the Final Completion Punchlist

**Next 90 Days**

- The completion of the Final Completion Punchlist items.
- Project closeout

Overview - both bascule spans open to marine traffic

Key Issues, Risks, and Decisions

• The project is investigating rebalancing the counterweight of both bascules in order to improve performance and reduce cold weather impacts that were observed last winter.

**Professional Services Contract Information**

	CONSULT Z91PS	CORP Z91PS	CONSULT Z92PS	COA COCORP Z91PS	CONSULT B92PS
Value	\$849,100	\$574,017	\$470,122	\$219,665	\$4,053,129
Paid to Date	\$749,644	\$467,857	\$330,405	\$132,494	\$3,897,390
Remaining	\$99,456	\$106,160	\$139,716	\$87,170	\$155,739

**Construction Contract Information**

	CORP CN01	CORP CN03
Value	\$7,494	\$66,823,514
Paid to Date	\$7,494	\$60,604,308
Remaining	\$0	\$6,219,205

**Schedule Summary**

Project Phase

- Design
- Planning
- Construction
- Closeout

**Cost Summary**

	Budget	CMS Funded	Committed	Est. at Completion	Budget Variance	Funding Variance	Paid-to-Date	% Expended
Project Administration	\$2,367,906	\$2,367,906	\$1,766,007	\$2,367,906	\$0	\$0	\$1,510,248	64%
Professional Service	\$4,586,567	\$4,586,567	\$4,513,243	\$4,586,567	\$0	\$0	\$3,458,568	75%
Real Estate Acquisition	\$67,500	\$67,500	\$62,500	\$67,500	\$0	\$0	\$62,500	93%
Construction	\$24,704,807	\$24,704,807	\$23,166,806	\$27,166,806	\$0	\$2,461,999	\$7,409,765	27%
Force Accounts	\$4,008,403	\$4,008,403	\$1,920,098	\$4,008,403	\$0	\$0	\$1,447,748	36%
Field Inspection	\$957,722	\$957,722	\$650,186	\$957,722	\$0	\$0	\$650,186	68%
Contingency	\$432,174	\$432,174	\$0	\$1,970,175	\$0	\$1,538,001	\$0	0%
<b>Grand Total</b>	<b>\$37,125,079</b>	<b>\$37,125,079</b>	<b>\$32,078,840</b>	<b>\$41,125,079</b>	<b>\$0</b>	<b>\$4,000,000</b>	<b>\$14,539,015</b>	

Washington, DC - USA

# Conclusion

## Key Focus Areas:

- Architecture to Support Growth
- Creating Capacity by Increasing Efficiency and Effectiveness
- Forecasting and Reporting Transparency, Accuracy, and Reliability
- Creating Capacity by Increasing Efficiency - “Getting at what Matters Most.”

*In executing the abovementioned changes, the MBTA Project Controls organization effectively transitioned from an oversight role that intervened when required, to an integrated part of the project teams, providing support through the whole project lifecycle. By implementing processes to provide more accurate and transparent planning, estimating, forecasting, and reporting, the Project Controls organization became an integrated partner within project teams.*





**THANK YOU**

